

Reply to the comment by J. E. T. Channell and J. S. Stoner on 'Magnetostratigraphy of the Hettangian Langmos section (Adnet, Austria): evidence for time-delayed phases of magnetization'

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Reply to the comment by J. E. T. Channell and J. S. Stoner on 'Magnetostratigraphy of the Hettangian Langmos section (Adnet, Austria): evidence for time-delayed phases of magnetization'

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In our paper, we have considered that the early origin of haematite in the reddish wackestones from the Langmoos section was questionable for several reasons: (1) no clear reversal test (antipodal directions) is available in this lithology; (2) we have evidence for remagnetization at least in parts of the sequence; and, (3) only one site was studied. The comparison (i.e. a fold test) between the characteristic component obtained from the reddish samples and the ones obtained from the Adnet Formation (Channell *et al.* 1990, 1992) does not provide a clear answer (the fold test is negative) because the bedding attitude is rather flat in this area. Therefore, no direct comparison can be made between the results from the Langmoos section, which does not belong to the Adnet Formation, and those obtained from the sites near by Adnet. Considering this point, we have only proposed that the magnetization in our samples was acquired before the large rotation of the NCA.

Another point must be underlined when the results from the Adnet Formation are considered. Channell and Stoner recall that two tests are available in these sites: a reversal test and a conglomerate test. The reversal test is fully convincing. The conglomerate test indicates that the growth of haematite in the Adnet Formation is a long process that encompasses at least the Sinemurian and the Pliensbachian (several million years). In the high unblocking temperature range, the random distribution of the directions that are isolated is in agreement with an early acquisition (lock-in) of this component. Channell *et al.* (1992) indicated that some clasts do not show the expected random direction indicating a magnetization acquired after the breccia formation. In their comment, Channell and Stoner also mention that it exist a secondary component (always of normal polarity?) which has the direction of the characteristic component. Did they observe this secondary component in samples from the Adnet Formation that have a characteristic component of reversed polarity? This component could be interpreted as resulting from a long process of growth of haematite and a late lock-in of this magnetization in these samples (but the persistent normal polarity should be explained). In the Langmoos section, where remagnetization phases exist, we have no argument to exclude that the reddish wackestones have only the secondary component.

Finally, in our paper, we were interested to understand the 'magnetostratigraphy' of the Hettangian Langmoos section that belongs to the 'Rot Grau Schnöll Marmor' Formation. We have only questioned the early diagenetic origin of the haematite in the reddish samples from this section, but not that from the overlying Sinemurian to Toarcian Adnet Formation to which Channell and Stoner are referring. Therefore, we have no problem with their comment.

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